Department of Electrical Engineering
Assignment
Date: 20/04/2020

Course Details

Course Title: Instrumentation and Measurement **Module:** 6th (BE)
Instructor: SIR WALEED JAN **Total Marks:** 30

Student Details

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Q1.	**(a)**	A student mistakenly connects an ammeter in parallel in a circuit. What will happen? Explain briefly. **ANS.** An ideal ammeter has zero resistance on the other hand a non ideal ammeter has very small resistance. When we connect an ammeter in parallel, as we know that current always follows low resistance path, maximum amount of current will flow through the ammeter which in turn will burn the fuse or can damage the ammeter. Therefore in electrical engineering labs, important precautions while connecting the circuits are, connect the ammeter in series and voltmeter in parallel.	**Marks 05** **CLO 2**
	(b)	A student mistakenly connects a voltmeter in series in a circuit. What will happen? Explain briefly. **ANS.** An ideal voltmeter has infinite resistance. So it's clear that it will block the current. Voltmeter is arranged in parallel. But current choose a path of low resistance in parallel circuit. An ideal voltmeter draws 0 current from the circuit. So when we arrange it in series it doesn't work as a voltmeter but as a resistance and also the reading shown by the voltmeter is the voltage across its terminals. So by knowing resistance of voltmeter and emf of source we can easily	**Marks 05** **CLO 2**

		calculate the unknown resistance of series circuit.	
Q2.	**(a)**	Random error cannot be easily reduced in measurements. Justify this statement. **ANS.** Random error in experimental measurements is caused by unknown and unpredictable changes in the experiment. These changes may occur in the measuring instruments or in the environmental conditions. Examples of causes of random errors are: • Electrical noise in the circuit of an electrical instrument. • Irregular changes in the heat loss rate from a solar collector due to changes in the wind. Random errors often have a Gaussian normal distribution. In such cases statistical methods may be used to analyze the data. The mean m of a number of measurements of the same quantity is the best estimate of that quantity, and the standard error of the estimate. The standard error of the estimate m is s/square (n), where n is the number of measurements.	**Marks 05** **CLO 1**
	(b)	What are the different reasons due to which gross error occurs in measurement? Explain briefly. **ANS.** Gross errors are caused by mistake in using instruments or meters, calculating measurement and recording data results. The best example of these errors is a person or operator reading pressure gage 1.01N/m2 as 1.10N/m2. It may be due to the person bad habit of not properly remembering data at the time of taking down reading, writing and calculating, and then presenting the wrong data at a later time. This may be the reason for gross errors in the reported data, and such errors may end up in calculation of the final results, thus deviating results.	**Marks 05** **CLO 1**
Q3.	**(a)**	What will happen if a spring in not connected with the coil of a moving coil galvanometer? Explain briefly. **ANS.** If a spring is not connected with the coil of a moving coil galvanometer then they will not provide the restoring force that pushes the pointer back to zero. It is the hair springs that make the deflection proportional to the force. And since the force is proportional to the current, it permits us to draw an analogue scalevunder the pointer and measure the current.	**Marks 05** **CLO 2**

	(b)	A student is performing an experiment in the laboratory during which he finds out that the measuring instrument is giving a Full Scale Deflection for a current of 10 μ A. He wants to measure a voltage of 20V with the help of this measuring instrument. Now, What should be the appropriate value of the resistor to be added with this instrument so that it can measure up to 20V? Moreover, should the resistor be connected in series or parallel with this instrument? **ANS. Given Data:** V=20v $I=10*10^{-6}$ **Find:** R=? **Solution:** We know that V=ig*(G+R) V=Maximum Potential Difference G= Resistance of Galvanometer R=High value of Resistance ig=current through Galvanometer v/ig=G+R v/ig – G=R $R=20/10*10^{-6}$ R=20/10*0.000001 R=2000000 $R=2*10^{6}$ R=2mega	**Marks 05** **CLO 02**